

**UTILITY APPLICATION**

of

**RICH SUGIMAE**

and

**MARNI INES**

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On

**FERRULE AND GOLF CLUB INCORPORATING SAME**

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**Attorneys**

**SHEPPARD, MULLIN, RICHTER & HAMPTON LLP**  
333 South Hope Street, 48<sup>th</sup> Floor  
Los Angeles, California 90071-1448  
Telephone: (213) 620-1780  
Facsimile: (213) 620-1398

## FERRULE AND GOLF CLUB INCORPORATING SAME

### BACKGROUND OF THE INVENTION

[0001] The present invention relates generally to golf clubs and, more particularly, a ferrule and hosel geometry for a golf club.

[0002] Golf clubs include a club head mounted to a tip of a shaft. Typically, the club head includes a cylindrical hosel that defines an opening for receiving the tip of the shaft. It is important that the junction of the hosel and shaft has sufficient strength for the rigors the golf club must endure. Also, abrupt edges at this junction lack esthetic appeal and can be a safety issue. To alleviate such concerns, sleeves positioned about the club shaft, referred to as ferrules, have been used.

[0003] Ferrules commonly are configured to have a lower portion positioned between the tip of the shaft and the hosel and to have an upper portion snug fit to the shaft. After prolonged use and exposure, such ferrules can loosen about the shaft and inhibit club performance. Alternatively, ferrules can be attached with adhesive to promote durability. However, caution must be taken during assembly to ensure that the ferrule does not separate from or twist about the hosel, particularly prior to setting of the adhesive. During club assembly, ferrules often must be polished by hand to be flush about the diameter of the hosel for a smooth, cosmetic transition between the shaft and the head. This process can be costly and time consuming.

[0004] It should, therefore, be appreciated that there exists a need for a ferrule for a golf club having improved durability and improved ease of assembly. The present invention fulfills this need and others.

### SUMMARY OF THE INVENTION

[0005] The present invention provides a ferrule, and a golf club incorporating same, configured for improved durability and ease of assembly. The ferrule defines an

axial bore for receiving a club shaft therethrough. A bottom portion of the ferrule is sized to receive and surround an upper end of a hosel of a club head. The hosel and the ferrule are cooperatively configured to inhibit movement of the ferrule and, preferably, axial rotation and longitudinal movement of the ferrule are both inhibited by engagement of corresponding surfaces of the ferrule and the hosel.

[0006] In a preferred embodiment, a plurality of protrusions, ribs and/or grooves are provided on an interior surface of the ferrule. More particularly, protrusions at an upper, interior surface of the ferrule body serve to help center the shaft tip within the ferrule body. Also, a lower interior surface of the ferrule can include an annular protrusion that mates with an annular groove defined in by the upper, exterior surface of the hosel.

[0007] In a detailed aspect of a preferred embodiment, a plurality of ribs at a lower, interior surface of the ferrule are received in corresponding grooves formed on an upper exterior surface of the club head hosel. These ribs serve to locate and initially fix the ferrule onto the hosel of the club head. Alternatively, the grooves may be provided on the ferrule and the ribs on the hosel. Preferably, a chamfer is provided at an exterior surface of a lower end of the ferrule.

[0008] In another preferred embodiment, the hosel includes an outer surface having at least one strut configured to inhibit axial rotation of the ferrule. Preferably, the strut has a knife-like edge configured to cut into the interior surface of the ferrule, thereby inhibiting axial rotation.

[0009] In a preferred method of assembly, savings in time and labor are achieved in that a ferrule may be provided on either the head or shaft prior to shipping by a vendor, excess adhesive is simply wiped off the club during final assembly and because of the net fit no grinding is required to match the ferrule and hosel diameters, thus preserving cosmetic features on the ferrule.

[0010] For purposes of summarizing the invention and the advantages achieved over the prior art, certain advantages of the invention have been described herein above. Of course, it is to be understood that not necessarily all such advantages may be achieved in accordance with any particular embodiment of the invention. Thus, for example, those skilled in the art will recognize that the invention may be embodied or carried out in a manner that achieves or optimizes one advantage or group of advantages as taught herein without necessarily achieving other advantages as may be taught or suggested herein.

[0011] All of these embodiments are intended to be within the scope of the invention herein disclosed. These and other embodiments of the present invention will become readily apparent to those skilled in the art from the following detailed description of the preferred embodiments having reference to the attached figures, the invention not being limited to any particular preferred embodiment disclosed.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0012] Embodiments of the present invention will now be described, by way of example only, with reference to the following drawings in which:

[0013] FIG. 1 is a cross-sectional view of a golf club in accordance with the invention, depicting a ferrule at a junction of a club shaft and hosel portion of a club head.

[0014] FIG. 2 is a cross-section view taken along line A-A of the golf club of FIG. 1, depicting protrusions of the ferrule in contact with the shaft.

[0015] FIG. 3 is a cross-sectional view taken along line B-B of the golf club of FIG. 1, depicting a conforming interface between the ferrule and hosel.

[0016] FIG. 4 is a close-up perspective view of the hosel portion of the club head of FIG. 1.

- [0017] FIG. 5 is a cross-sectional view the hosel portion of the club head of FIG. 1
- [0018] FIG. 6 is a perspective view of the ferrule of FIG .1.
- [0019] FIG. 7 is a cross-sectional view of the ferrule of FIG. 1.
- [0020] FIG. 8 is a cross-sectional view a ferrule in another embodiment in accordance with the invention.
- [0021] FIG. 9 is a perspective view of a hosel portion corresponding to the ferrule of FIG. 8.
- [0022] FIG. 10 is a cross-sectional view of the hosel of FIG. 9.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0023] With reference to the illustrative drawings, and particularly to FIG. 1, there is shown a junction portion of a golf club 10 in which a club shaft 12 and a hosel 14 are received within a bore 16 of a ferrule 18. The ferrule includes an upper portion 22 positioned about the shaft and a lower portion 24 positioned about an end 26 of the hosel. The upper portion includes protrusions 28 that serve to align the shaft within the bore of the ferrule. The lower portion of the ferrule is configured to cooperatively engage the end of the hosel such that the ferrule is securely affixed to the hosel and, to that end, the ferrule includes an annular ridge 30 adjacent to a lower opening 32 (FIG. 7) of the bore. The ridge engages a recessed portion 34 of the hosel, maintaining the ferrule in place. The lower edge 36 of the ferrule preferably is chamfered or rounded to facilitate installation onto the hosel. Moreover, the lower portion of the ferrule and the end of the hosel are cooperatively configured to inhibit axial rotation of the ferrule.

[0024] With reference to FIG. 2, the protrusions 28 at the upper portion 22 of the ferrule aid in centering the shaft within the bore 16 providing a cavity 40. The cavity facilitates a flow of adhesive between the shaft, hosel and ferrule, thereby promoting a

secure and durable bond amongst these components. During assembly, excess adhesive can flow past the protrusions and out an upper opening 42 (FIG. 7) of the bore, as needed. Thereafter, excess adhesive can simply be wiped off. Although the present embodiment employs three protrusions, other embodiments having different numbers of protrusions and having protrusion of different configurations are contemplated.

[0025] With reference now to FIG. 3, the lower portion 24 of the ferrule and the end 26 of the hosel cooperatively engage to inhibit rotation of the ferrule about the hosel. More particularly, the ferrule further includes a plurality of ribs 44 longitudinally aligned about an interior surface 46 and positioned above the annular ridge 30 (FIG. 7). The ribs are received in corresponding grooves 48 formed on an upper exterior surface of the hosel. In this manner, the hosel and the ferrule cooperative to inhibit axial rotation of the ferrule, this facilitates assembly and the setting of the adhesive. In the exemplary embodiment, the ribs are positioned above the annular ridge. Other structural configurations can be employed to inhibit axial rotation of the ferrule. For example, the ribs and corresponding grooves can be positioned below or incorporated into the annular ridge and the annular recess 34, respectively.

[0026] With reference to FIGS. 4 and 5, the hosel 14 is generally cylindrical having a centered bore 41 sized to receive the shaft 16. In this embodiment, the hosel bore has a diameter  $D_b$  of about 9.6 mm at the upper portion 22 thereof. The hosel bore is defined by an interior surface 50 that includes a tapered portion 54 proximate to the opening into the bore. This tapered portion aids in receiving the shaft into the bore as well as facilitating adhesive flow. As best shown in FIG. 1, even with the shaft in place, the tapered portion affords adhesive flow therein.

[0027] The end 26 of the hosel includes a locking rim 38, defining the longitudinal grooves 48 (FIG. 4) spaced there about. The rim further serves to restrict longitudinal movement of the ferrule 18 by interacting with the ridge 30 (FIG. 7). In this embodiment, the hosel has an outer diameter  $D_1$  of about 11.63 mm at the rim.

Continuing down the outer surface 52 of the hosel, the rim leads to the recessed portion 34, which in this embodiment has an outer diameter  $D_2$  of about 11.48 mm. Following the recessed portion the outer surface extends laterally out, defining an annular edge that cooperates with the chamfered edge 36 (FIG. 1) of the ferrule to provide a smooth transition seam between the hosel and the ferrule.

[0028] With reference to FIGS. 6 and 7, the bore 18 of the ferrule has a variable inner diameter profile, including a minimum diameter sufficient to receive the club shaft. At the ridge 30 of the ferrule, an inner diameter  $D_3$  is provided, less than both the outer diameter  $D_1$  and  $D_2$  of the hosel. Here, inner diameter  $D_3$  is about 11.35 mm. Thus, in this embodiment, the ferrule deflects as the ridge passes the locking rim 38 of the hosel and securely engages the outer surface of the hosel. The ferrule is provided with an exterior surface 50 (FIG. 50) that is smoothly tapered across its longitudinal length, providing an aesthetic and functional transition between the club head and the shaft. The exterior surface can be provided with concave regions and/or raised regions to provide identifying indicia on the ferrule. The ferrule 18 is formed of a lightweight yet durable material, e.g., nylon, polycarbonate, and polyoxymethylene. Materials having a density less than about 2 g/cc and a modulus of elasticity no greater than about 3 GPa have been found to be effective. Optionally, a colorant can be added to the material. In the exemplary embodiment, the ferrule is formed of an acetal resin compound commonly known as Delrin<sup>®</sup>, from E.I. du Pont de Nemours and Co.

[0029] Alternative embodiments of a hosel 114 and a ferrule 118 are shown in FIGS. 8-10, with like numerals referring to like elements. With reference to FIG. 8, the ferrule 118 may be substantially the same as shown in FIG. 7, absent the plurality of ribs 44 about the annular ridge 30. In place of the ribs 44 on the ferrule being received in corresponding grooves formed in the hosel, longitudinal struts 60 shown in FIGS. 9-10 are provided on the recessed portion 34 of the hosel 114 to inhibit axial rotation of the ferrule. The struts are relatively thin and form knife-like edges that cut into annular ridge

of the ferrule to inhibit axial rotation thereof. A single strut or a plurality of struts may be provided, as desired. The preferred embodiment shown in FIGS. 9-11 has four struts equally spaced about the hosel.

[0030] With reference again to FIG. 1, the golf club 10 is configured for easy assembly. In an exemplary approach, the ferrule 18 is pre-positioned on either the head or the shaft 12. The ferrule can be positioned even prior to shipment of either the head or the shaft by a vendor. Adhesive is applied in the opening of the hosel, and the tip of shaft is then inserted. In addition or alternatively, adhesive can be applied directly to the shaft and/or the ferrule prior to insertion. Regardless of the approach, the cavity 40 (FIG. 2) defined therein enables effective flow of the adhesive amongst the components. Excess adhesive can exit the cavity, allowing it to be wiped off. The ferrule is positioned over the upper end of the hosel, such that the annular ridge 30 of the ferrule is received within the annular recess of the hosel. Once positioned, axial rotation of the ferrule is inhibited, which facilitates the setting of the adhesive.

[0031] It should be appreciated from the foregoing that the present invention provides a ferrule, and a golf club incorporating same, configured for improved durability and ease of assembly. The ferrule defines an axial bore for receiving a club shaft therethrough. A bottom portion of the ferrule is sized to receive and surround an upper end of a hosel of a club head. The hosel and the ferrule are cooperatively configured to inhibit movement of the ferrule. In a preferred embodiment, axial rotation and longitudinal movement of the ferrule are both inhibited by engagement of corresponding surfaces of the ferrule and the hosel. Alternatively, the hosel may include at least one strut having a knife-like edge configured to cut into the interior surface of the ferrule, thereby inhibiting axial rotation. The ferrule can be provided with protrusions.

[0032] Although the invention has been disclosed in detail with reference only to the preferred embodiments, those skilled in the art will appreciate that additional ferrules

and golf club incorporating same can be included without departing from the scope of the invention. Accordingly, the invention is defined only by the claims set forth below.